

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 950 436 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.10.1999 Bulletin 1999/42

(51) Int. Cl.⁶: B05C 5/02

(21) Application number: 99105750.6

(22) Date of filing: 22.03.1999

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 15.04.1998 US 60581

(71) Applicant:
ILLINOIS TOOL WORKS INC.
Glenview, Cook County, Illinois 60025 (US)

(72) Inventor: Kwok, Kui-Chiu
Mundelein, Illinois 60060 (US)

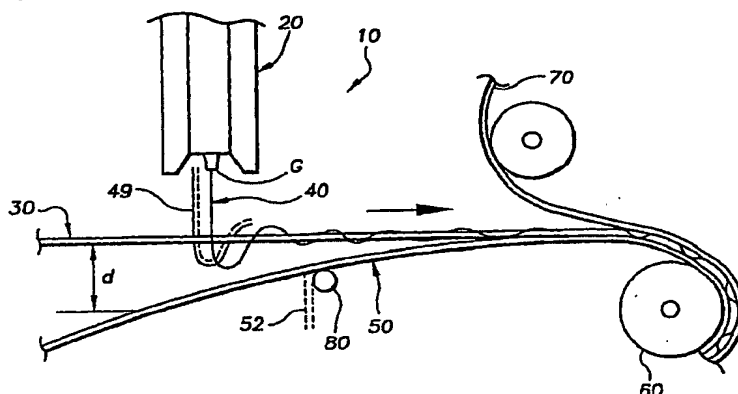
(74) Representative:
Vetter, Ewald Otto (DE) et al
Meissner, Bolte & Partner
Anwaltssozietät GbR
Postfach 10 26 05
86016 Augsburg (DE)

(54) Elastic strand coating process

(57) A method for applying fluids to a strand and useable for bonding adhesive coated strands (30) to substrates (50) in the production of bodily fluid absorbing hygienic articles, by drawing the strand (30) along an isolated path, moving a fluid or adhesive fiber (40) back and forth across a path of the strand (30) as the fluid fiber is dispensed toward the strand (30), and capturing substantially all of the fluid fiber on the isolated strand (30), and in some applications contacting an adhesive coated strand (30) with the substrate to bond

the strand thereto (50). The adhesive fiber is vacillated back and forth across a path of the strand (30) beyond opposing sides thereof to at least partially coat all sides thereof with adhesive. In bodily fluid absorbing hygienic articles, the methods substantially eliminate fabric stiffening and loss of moisture absorbing capacity thereof, provide substantially uniformly bonding along the axial dimension of the strand (30) to ensure uniform bunching of fabrics, optimum fluid absorption, and comfort.

FIG. 1



EP 0 950 436 A2

Description

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application is related to copending U.S. Application No. 08/843,224, filed 14 April 1997, entitled "Improved Meltblowing Method and System", and to copending U.S. Application No. 08/717,080, filed 8 October 1996, entitled "Meltblowing Method and Apparatus", all commonly assigned and incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] The invention relates generally to adhesive dispensing systems, and more particularly to processes for bonding one or more relatively elongated strands to one or more substrates, especially bonding stretched elastic strands to fabrics in the manufacture of bodily fluid absorbing hygienic articles.

[0003] It is often desirable to bond or adhere relatively elongated members, or strands, onto substrates. In the manufacture of a variety of bodily fluid absorbing hygienic articles including diapers, incontinence pads and other undergarments, for example, stretched elastic strands are bonded between fabrics to form waste bands and other stretchable portions thereof. In diapers, the waste bands and particularly the leg bands must provide relatively fluid tight seals between the undergarment and the body.

[0004] In known bodily fluid absorbing hygienic article manufacturing processes, adhesive is sprayed onto stretched elastic strands disposed on or very near an underlying fabric substrate moving relative to one or more adhesive dispensing nozzles. The adhesive is usually a hot melt adhesive dispensed in a swirling spiral pattern by a spiral nozzle, and is applied generously to both the substrate and the elastic strands simultaneously. The stretched elastic strand is usually bonded between overlapping fabric layers. As the stretched elastic strands contract, the fabric adhered thereto is bunched together forming generally pleated waste bands and other stretchable portions of the undergarment. It is important that the elastic strand be bonded to the fabric substantially continuously along its axial length to ensure uniform pleating, or bunching, of the fabric, which is necessary for optimum comfort and fluid absorption, and to provide an aesthetically pleasing product.

[0005] U.S. Patent No. 5,507,909, issued 16 April 1996, entitled "Apparatus For The Manufacture Of An Elongated Element Comprising Helically Patterned Adhesive" discloses a process and apparatus for helically wrapping adhesive onto an elastic strand, which is bonded to a substrate in the manufacture of disposable absorbent products without coating adjacent areas of the substrate with large amounts of adhesive. To helically coat the elastic strand with adhesive, the strand is

rotated about its axis as it is drawn past an adhesive flow from a dispensing orifice, for example by drawing the elastic strand between a nip roll assembly rotated at an angle relative thereto, or by other disclosed but less certain strand rotating means.

[0006] The known processes, however, generally apply much more adhesive onto the elastic strands and underlying substrate than is required for bonding, resulting in unnecessarily increased costs. The excess adhesive, which is usually hot, also has a tendency to deform the relatively thin, temperature sensitive fabric, thereby providing an undesirable appearance. In extreme cases the hot adhesive may destroy the fabric by burning a hole therethrough.

[0007] Another adverse effect of applying excessive amounts of adhesive onto fabrics is that the adhesive tends to stiffen the fabric. This stiffening is particularly undesirable in diaper and other undergarment applications where the elastic strand bunches the fabric to form waste bands and other stretchable portions that contact the body intimately. More particularly, the stiffened fabric tends not to bunch as freely and uniformly as it would otherwise, thereby compromising the ability of the fabric to form an effective fluid seal when stretched against the wearer's body.

[0008] The excess adhesive applied onto the fabric may also reduce the fluid absorbing capacity thereof, resulting possibly in the leakage of bodily fluids and in the accumulation of perspiratory moisture on the wearer's body, which may be particularly uncomfortable where waste and leg band portions of the garment contact the skin directly. Additionally, the adhesive stiffened fabric may be slightly abrasive against the skin, and in some extreme cases may irritate allergically sensitive skin.

[0009] The process and apparatus disclosed in the prior art U.S. Patent No. 5,507,909 entitled "Apparatus For The Manufacture Of An Elongated Element Comprising Helically Patterned Adhesive" allegedly reduce the amount of adhesive applied to the substrate and apply more conservative amounts of adhesive onto the elastic strand, but the uniform application of adhesive helically about the strand requires consistently and uniformly controlling the rotation of the strand during the drawing thereof. It is questionable whether the elastic strand may be consistently rotated uniformly as required to uniformly apply adhesive helically thereabout in manufacturing operations. If the adhesive is not applied uniformly along the axial dimension of the strand, the stretched strand will not bond uniformly to the substrate, which adversely affects uniform bunching of the fabric. Non-uniform bunching is undesirable from an aesthetic viewpoint, and more substantively non-uniform bunching of the fabric compromises the ability of the fabric to form an effective fluid seal, and reduces the softness and comfort thereof when stretched against the wearer's body.

[0010] The present invention is drawn generally

toward advancements in the art of applying fluids including adhesives onto strands, and more particularly toward bonding adhesive coated strands to substrates, especially adhesive coated elastic strands to fabrics in the manufacture of bodily fluid absorbing hygienic articles.

[0011] It is an object of the invention to provide novel methods for applying fluids to strands, and for bonding adhesive coated strands to substrates, and combinations thereof, that are economical and overcome problems in the prior art.

[0012] It is another object of the invention to provide novel methods for applying hot melt adhesives to elastic strands, and for bonding adhesive coated elastic strands to fabrics to form waist bands and other stretchable portions in the manufacture of a variety of bodily fluid absorbing hygienic articles and disposable absorbent products using reduced amounts of adhesive.

[0013] It is a further object of the invention to provide novel methods for bonding adhesive coated elastic strands to fabric substrates in the manufacture of a variety of bodily fluid absorbing hygienic articles, wherein the elastic strand is bonded to the fabric substantially uniformly along an axial length thereof to ensure uniform bunching of the fabric, thereby providing optimum comfort and fluid absorption, and an aesthetically pleasing, more marketable product.

[0014] It is yet another object of the invention to provide novel methods for reducing the amount of adhesive applied to elastic strands bonded to underlying fabric substrates in the manufacture of a variety of bodily fluid absorbing hygienic articles to reduce the possibility of melting the fabric with hot melt adhesives, to substantially eliminate fabric stiffening and to eliminate loss of moisture absorbing capacity thereof, and to reduce costs, especially costs associated with excess adhesive usage.

[0015] It is a more particular object of the invention to provide novel methods for applying fluids to a strand, useable for bonding the strand to a substrate in the production of bodily fluid absorbing hygienic articles, by drawing the strand along an isolated path, moving a fluid fiber across a path of the strand as the fluid fiber is dispensed toward the strand so that the fiber contacts the strand, and capturing substantially all of the fiber on the isolated strand. The fiber is preferably vacillated back and forth across a path of the strand, and beyond opposing sides thereof to at least partially coat all sides thereof with fluid.

[0016] It is another more particular object of the invention to provide novel methods for bonding strands to substrates in the production of bodily fluid absorbing hygienic articles by drawing the strand along a path separated spatially from the substrate, dispensing an adhesive fiber toward the strand so that at least a portion of the adhesive fiber crosses the path of the strand and contacts the strand, capturing substantially all of the adhesive fiber on the strand when the strand is spatially

separated from the substrate to at least partially coat the strand with adhesive, and contacting the adhesive coated strand with the substrate to bond the strand thereto. The fiber is preferably vacillated back and forth across a path of the strand, and beyond opposing sides thereof to at least partially coat all sides thereof with adhesive.

[0017] These and other objects, aspects, features and advantages of the present invention will become more fully apparent upon careful consideration of the following Detailed Description of the Invention and the accompanying Drawings, which may be disproportionate for ease of understanding, wherein like structure and steps are referenced generally by corresponding numerals and indicators.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

FIG. 1 is a partial side view elevational view of a system for applying fluids to strands, and for bonding adhesive coated strands to substrates according to an exemplary embodiment of the invention.

FIG. 2a is a partial sectional view of fluid fibers dispensed toward corresponding strands.

FIG. 2b is an end view of an exemplary nozzle for dispensing a plurality of fluid fibers toward a corresponding plurality of strands.

FIG. 3 is a partial perspective view of a strand at least partially coated with fluid on all sides thereof according to an exemplary embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0019] FIG. 1 is a system 10 for practicing methods of applying fluids including adhesives to strands, and in some applications, bonding adhesive coated strands onto substrates according to the present invention. The exemplary system 10 dispenses hot melt adhesive fibers 40 from one or more adhesive dispensing nozzles 20, which are preferably meltblowing nozzles having one or more adhesive orifices and corresponding first and second air dispensing orifices disposed on opposing sides thereof as shown in FIG. 2 and discussed further below. The present invention is applicable more generally to applying fluids 40 to strands 30, which capture substantially all of the fluid dispensed from the nozzle 20 to prevent unwanted application of fluid onto an underlying substrate or other areas and to reduce fluid waste.

[0020] An exemplary application is the bonding of adhesive coated stretchable elastic strands 30 onto fabric substrates 50 in the manufacture of a variety of bodily fluid absorbing hygienic articles. The methods of the present invention are particularly useful in applications where it is desirable generally to precisely control the

dispensing of relatively viscous fluids, including but not limited to hot melt adhesive fibers, onto a strand, and in some applications thereafter to bond adhesive coated strands onto substrates as discussed further below. Thus the fluid fibers 40 dispensed from the nozzle 20 are not necessarily limited to meltblown fibers, but are more generally any fluid that may be controllably dispensed so that substantially the entire fluid is captured by the strand 30.

[0021] In FIG. 1, the nozzle 20 dispenses a fluid fiber 40 toward an isolated strand 30 drawn along a path so that at least a portion of the fluid fiber 40 crosses the path of the strand 30 and contacts the strand so that the fluid fiber 40 attaches thereto. The spatially isolated strand 30 captures substantially all of the fluid fiber 40 dispensed from the nozzle 20, whereby the strand 30 is at least partially coated with fluid. By capturing substantially all of the fluid dispensed from the nozzle 20 onto the spatially isolated strand 30 there is little or no wasted fluid, thereby economizing the application thereof. Capturing all of the fluid fiber 40 onto the strand 30 also reduces the likelihood that fluid will spill-over or be applied inadvertently to unintended areas, for example underlying substrates.

[0022] The fluid fiber 40 is preferably a substantially continuous fiber, although it may be intermittently discontinuous so long as a portion of the fiber crosses the path of the strand and attaches thereto. FIG. 2a illustrates the fluid fiber preferably moving back and forth across the path of the strand 30 as the fluid fiber 40 is dispensed toward the strand 30. The viscosity, mass, and range of movement of the fluid fiber 40 back and forth across the path of the strand 30 are selected or controlled so that the spatially isolated strand 30 captures substantially all of the fluid fiber 40 dispensed from the nozzle 20. Variations in the dispensing of the fluid fiber 40 from the nozzle 20, resulting for example from supply pressure changes and residue accumulation in the nozzle orifice and other factors, may result in fluid fiber 40 discontinuities or in fluid dispensing irregularities that occasionally prevent the fibers 40 or portions thereof from being captured entirely by the strand 30.

[0023] FIGS. 2a and 3 illustrate the fluid fiber 40 moving back and forth across a path of the strand 30, wherein fluid fiber portions 42 and 44 move beyond corresponding opposing sides 32 and 34 of the strand 30 as the fluid fiber 40 is dispensed toward the strand 30. Fluid fibers thus dispensed are captured substantially entirely by the strand 30, whereby all sides of the strand 30 are at least partially coated with fluid. Thus applied, the adhesive fibers 40 coat the strand 30 substantially uniformly along the axial dimension or length thereof, which is desirable in many applications, particularly in the manufacture of bodily fluid absorbing hygienic articles where it is desirable to uniformly bond an adhesive coated elastic strand onto a fabric substrate to uniformly bunch the fabric forming waste bands and other stretchable portions thereof. Substantially uniformly applying

the adhesive fibers 40 along the axial dimension of the strand 30 without coating the entire strand also substantially reduces adhesive usage while providing relatively uniform bonding to the substrate.

[0024] FIG. 3 illustrates, more particularly, the fiber portions 42 and 44 draping downwardly along the corresponding sides 32 and 34 of the strand 30 after other fiber portions 41 contact the strand 30. The fiber portions 42 and 44 are preferably dispensed by the nozzle 20 to extend sufficiently outwardly beyond the corresponding sides 32 and 34 of the strand 30 so that portions thereof 43 adhere also to an underside 36 of the strand 30. In some applications, the fiber portions 42 and 44 may even extend and adhere down along one side of the strand, across the underside thereof, and back upwardly along the opposing side of the strand 30, sometimes wrapping more than once about the strand.

[0025] The portions 42 and 44 of the fiber moving back and forth across the path of the strand 30 drape over the strand 30 under the influence of momentum or gravity or a combination thereof, and ultimately the fiber 40 adheres at least partially to all sides of the strand 30 including a top side 31, opposing sides 32 and 34, and the underside 36 thereof. The adhesive fiber 40 is dispensed preferably from the nozzle 20 located above the isolated strand 30, and adheres initially to the top side 31 of the strand 30. The fiber 40 then migrates downwardly along the sides of the strand 30 and across the underside thereof to at least partially coat all sides thereof. The adhesive may thus be applied uniformly along the axial dimension of the strand 30, without coating the entire strand, thereby economizing on the application of adhesive and at the same time applying adequate amounts thereof to the strand to ensure uniform bonding of the strand 30 along the axial dimension thereof to the substrate.

[0026] The fiber portions 42 and 44 preferably are not dispensed to extend so far outwardly beyond the corresponding sides 32 and 34 of the strand 30 that the fluid fiber 40 can not be captured substantially entirely by the strand 30. The fluid fiber mass flow rate, fluid viscosity, and size and stability of the strand 30 are among the factors that limit the extent to which the fiber 40 may extend beyond the sides of the strand 30 and ultimately be substantially entirely captured thereby.

[0027] Precisely controlling the dispensing of fluid fibers from the nozzle 20 ensures that the strand 30 captures substantially all of the fluid fiber 40. Precisely controlling the dispensing of the fluid fibers 40 also ensures that fluid is applied at least partially to substantially all sides of the strand 30 and substantially uniformly along the axial dimension thereof. By appropriately controlling the dispensing of the fluid, and generally the rate at which the strand 30 is drawn relative to the nozzle 20, it is possible to accurately control the amount or quantity of fluid applied to the strand.

[0028] In the exemplary application, the fluid fiber 40 is a substantially continuous hot melt adhesive fiber dis-

pensed from an adhesive orifice G of a meltblowing nozzle 20. FIG. 2a illustrates the adhesive fiber 40 vacillating back and forth across the path of the strand 30 and beyond opposing sides thereof under the influence of first and second air flows dispensed from first and second air orifices A1 and A2 disposed on opposing sides of corresponding adhesive orifices G1 and G2 of the nozzle 20. The amplitude and frequency of vacillation of adhesive fibers 40 is controlled by the first and second air flows as disclosed more fully in the referenced copending U.S. Application No. 08/843,224, entitled "Improved Meltblowing Method and System", and copending U.S. Application No. 08/717,080, entitled "Meltblowing Method and Apparatus". In an alternative embodiment, hot melt adhesive fibers are dispensed from a spiral nozzle in a swirling pattern to move the adhesive fiber back and forth across the path of the strand as the adhesive fiber is dispensed toward the strand. The meltblowing nozzles of the types disclosed in the referenced copending U.S. Application No. 08/843,224, entitled "Improved Meltblowing Method and System", and copending U.S. Application No. 08/717,080, entitled "Meltblowing Method and Apparatus", however are believed to provide relatively superior control over the adhesive flow in comparison to known spiral nozzles, and are particularly suitable for applying adhesive fibers, which are capturable substantially entirely by corresponding strands according to the present invention.

[0029] In applications where the strand 30 is bonded between substrates and where the strand 30 has a tendency to twist prior to bonding onto a single substrate, it is desirable to at least partially coat all sides of the strand 30 with adhesive, to ensure complete bonding of the strand 30 to the substrate 50. It is desirable in other applications, for example where an elastic strand 30 forms a waste band or other stretchable portion of a garment, to apply adhesive substantially uniformly along the axial dimension thereof, and preferably at least partially to all sides of the strand, to ensure uniform bonding of the strand 30 along an axial dimension thereof to a fabric substrate, thereby providing substantially uniform bunching of the fabric as the elastic strand contracts. The extent to which the strand 30 is coated with adhesive is controlled generally by the adhesive fiber mass flow rate, fiber vacillation amplitude and frequency, and the strand drawing rate.

[0030] FIG. 1 illustrates the application of adhesive fibers onto a strand 30 and bonding of the adhesive coated strand 30 to a substrate 50. Initially, the strand 30 is drawn along a path separated spatially from the substrate 50. The adhesive fiber 40 is dispensed toward the isolated strand 30 so that at least a portion of the adhesive fiber 40 crosses the path of the strand 30 and attaches thereto, as shown in FIG. 2. As discussed above, the fiber 40 is preferably vacillated back and forth across the path of the strand 30, beyond opposing sides thereof. The strand 30 captures substantially all of

the adhesive fiber 40 when the strand 30 is spatially separated from the substrate 50 to at least partially coat the strand 30 with adhesive. Preferably, the adhesive is applied at least partially to all sides of the strand 30 to ensure uniform bonding of the strand along an axial dimension thereof to the substrate 50. The adhesive coated strand 30 is then contacted with the substrate 50 to bond the strand 30 thereto before the adhesive sets.

[0031] In the manufacture of bodily fluid absorbing hygienic articles, the substrate 50 is fabric, and the strand 30 is an elastic strand that is stretched by applying tension thereto before bonding to the substrate 50. FIG. 1 illustrates the strand 30 and the substrate 50 both drawn by common roller 60. In this exemplary application, the stretched adhesive coated elastic strand 30 is also bonded to a second fabric substrate 70, which may also be drawn by the roller 60, whereby the strand 30 is disposed between and bonded to the substrate 50 and the substrate 70. The adhesive is applied at least partially to all sides of the strand 30 and preferably substantially uniformly along the axial dimension thereof as discussed above to ensure that the strand 30 bonds uniformly to both fabric substrates 50 and 70.

[0032] In applications where the substrate 50 is adjacent the strand 30 and opposite the adhesive dispensing nozzle 20, it is necessary to spatially separate the substrate 50 from the strand 30 by a distance "d" greater than a droop distance of the adhesive fiber 40 below the strand 30 opposite the adhesive nozzle 20 to prevent adhesive from inadvertently adhering to the substrate 50. In other applications, the adhesive 40 may be applied to the strand 30 away from the substrate 50, to ensure that no adhesive 40 is inadvertently applied thereto, wherein the substrate 50 may be supplied for example from below roller 80 along the path 52 away from fluid fibers 40 dispensed from the nozzle 20.

[0033] FIG. 2a illustrates the nozzle 20 dispensing a plurality of at least two fluid or adhesive fibers 40 from a corresponding plurality of adhesive orifices G1 and G2 toward corresponding isolated strands 30, wherein each of the plurality of adhesive fibers 40 is vacillated back and forth across the path of the corresponding strand 30 with a plurality of corresponding first and second air flows dispensed from first and second air orifices A1 and A2 disposed on opposing sides of the corresponding adhesive orifices G1 and G2, according to the modes of operation discussed above, and particularly those disclosed more fully in the referenced copending U.S. Application No. 08/843,224, entitled "Improved Meltblowing Method and System", and copending U.S. Application No. 08/717,080, entitled "Meltblowing Method and Apparatus".

[0034] Each strand 30 captures substantially all of the adhesive fiber 40 dispensed from the corresponding adhesive orifice G1 and G2 when the strand 30 is spatially separated from the substrate to at least partially coat the strand 30 with adhesive. The adhesive fibers

are preferably vacillated back and forth across the path of the corresponding strand beyond opposing sides thereof to at least partially coat all sides of each strand with adhesive, preferably substantially uniformly along the axial dimension thereof. In some applications, the plurality of adhesive coated strands are subsequently contacted with one or more substrates to bond the plurality of strands thereto as discussed above.

[0035] FIG. 2a illustrates the plurality of adhesive orifices G1 and G2 and corresponding air orifices of the nozzle 20 arranged generally in a series. In one embodiment illustrated in FIG. 2b, adjacent adhesive fibers are dispensed from adhesive orifices G1 and G2 with corresponding air orifices A1 and A2 disposed, or offset, relative to each other in different planes of the nozzle 20. For example, all odd numbered adhesive orifices G1 and G3 and the corresponding air orifices are disposed serially in a first plane, and all even numbered adhesive orifices G2 and G4 and the corresponding air orifices are disposed serially in a second plane different from the first plane, whereby adjacent adhesive flows are offset axially along the strand 30, as illustrated by adhesive flows 40 and 49 in FIG. 1. Alternatively, all of the adhesive dispensing orifices may be disposed in series in a single common plane. These various aspects of the adhesive dispensing nozzles are disclosed more fully in the referenced copending U.S. Application No. 08/843,224, entitled "Improved Meltblowing Method and System", and copending U.S. Application No. 08/717,080, entitled "Meltblowing Method and Apparatus".

[0036] FIG. 2a illustrates the amplitude of vacillation of adjacent fibers 40 apparently overlapping without interference therebetween. More particularly, when the adhesive dispensing orifices G1 and G2 are adjacent to each other in a common plane, the vacillating fibers 40 dispensed therefrom have a tendency to synchronize or to deflect from the common plane one way or the other along an axial direction of the corresponding strand 30 to avoid interference with each other. This phenomenon permits dispensing fluid or adhesive fibers 40 from relatively closely spaced adhesive dispensing orifices toward relatively closely spaced corresponding strands 30, wherein the adhesive fibers 40 vacillate apparently overlappingly but without interference therebetween. The vacillating fibers 40 are thus captured substantially entirely by the corresponding strands 30, as discussed above, without interference from adjacent fibers 40 and without spillage or overspray of adhesive resulting from interference between or entanglement of the adjacent fibers.

[0037] While the foregoing written description of the invention enables one of ordinary skill to make and use what is considered presently to be the best mode thereof, those of ordinary skill will appreciate and acknowledge the existence of variations, combinations, and equivalents of the specific exemplary embodiments herein. The invention is therefore to be limited not by the

exemplary embodiments, but by all embodiments within the scope and spirit of the appended claims.

Claims

1. A method for applying adhesive to a strand, and useable for bonding the strand to a substrate in the production of bodily fluid absorbing hygienic articles, the method comprising:
 - drawing the strand along a path separated spatially from the substrate;
 - dispensing an adhesive fiber toward the strand;
 - capturing substantially all of the adhesive fiber on the strand when the strand is spatially separated from the substrate; and
 - contacting the adhesive coated strand with the substrate to bond the strand to the substrate.
2. The method of Claim 1 further comprising moving the adhesive fiber back and forth across the path of the strand as the adhesive fiber is dispensed toward the strand.
3. The method of Claim 1 further comprising dispensing a substantially continuous adhesive fiber toward the strand, and moving the adhesive fiber back and forth across the path of the strand as the adhesive fiber is dispensed toward the strand.
4. The method of any one of the preceding claims, the strand is an elastic strand and the substrate is a fabric for a bodily fluid absorbing hygienic article, the method further comprising stretching the elastic strand before the elastic strand is bonded to the substrate.
5. The method of any one of the preceding claims, the adhesive fiber is a hot melt adhesive dispensed from an adhesive orifice of a meltblowing nozzle, the method further comprising vacillating the adhesive fiber back and forth across the path of the strand with first and second air flows dispensed from first and second air orifices disposed on opposing sides of the adhesive orifice.
6. The method of Claim 5 further comprising controlling the amplitude and frequency of vacillation of the adhesive fiber with the first and second air flows to capture substantially all of the adhesive fiber by the strand.
7. The method of Claim 5 or 6 further comprising controlling the amplitude and frequency of vacillation of the adhesive fiber with the first and second air flows so that the strand is coated substantially uniformly with adhesive along an axial dimension of the strand.

8. The method of any one of claims 5 to 7 further comprising dispensing the adhesive from above the strand, and spatially separating the strand from the substrate by a distance greater than a droop distance of the adhesive fiber below the strand opposite from where the adhesive fiber is dispensed from above the strand. 5
9. The method of any one of claims 6 to 8 further comprising:
- drawing a plurality of at least two strands;
dispensing a plurality of adhesive fibers from a corresponding plurality of adhesive orifices of the nozzle toward a corresponding one of the plurality of strands;
vacillating the plurality of adhesive fibers back and forth across the path of the corresponding strand with a plurality of corresponding first and second air flows dispensed from first and second air orifices disposed on opposing sides of the plurality of adhesive orifices;
each strand capturing substantially all of the adhesive fiber dispensed from the corresponding adhesive orifice when the strand is spatially separated from the substrate to substantially uniformly coat the strand with adhesive; and
contacting the plurality of adhesive coated strands with the substrate to bond the plurality of strands to the substrate. 10 15 20 25 30
10. The method of Claim 9 further comprising dispensing the corresponding plurality of air flows from the corresponding plurality of air orifices arranged in series with the corresponding plurality of adhesive orifices. 35
11. The method of Claim 9 or 10 further comprising dispensing at least two adjacent adhesive fibers from corresponding adhesive orifices offset axially relative to each other along the path of the strand. 40
12. The method of any one of the preceding claims, the adhesive fiber is a hot melt adhesive, the method further comprising dispensing the adhesive fiber from a spiral nozzle in a swirling pattern to move the adhesive fiber back and forth across the path of the strand as the adhesive fiber is dispensed toward the strand. 45
13. A method for applying fluid to a strand, and useable for bonding the strand to a substrate in the production of bodily fluid absorbing hygienic articles, the method comprising:
- drawing the strand along an isolated path;
dispensing a fluid fiber toward the strand;
moving the fluid fiber back and forth across a path of the strand as the fluid fiber is dispensed toward the strand;
capturing substantially all of the fluid fiber on the strand; and
coating all sides of the strand at least partially with fluid. 5
14. The method of Claim 13 further comprising moving the fluid fiber back and forth across a path of the strand beyond opposing sides of the strand as the fiber is dispensed toward the strand to coat all sides of the strand at least partially with fluid. 10
15. The method of Claim 14, the fluid is adhesive, the method further comprising:
- drawing the strand along a path separated spatially from a substrate;
dispensing an adhesive fiber from above the strand;
moving the adhesive fiber back and forth across the path of the strand as the adhesive fiber is dispensed toward the strand;
capturing substantially all of the adhesive fiber on the strand when the strand is spatially separated from the substrate;
coating all sides of the strand at least partially with adhesive when the strand is spatially separated from the substrate; and
contacting the adhesive coated strand with the substrate to bond the strand to the substrate. 15 20 25 30
16. The method of Claim 15, the strand is an elastic strand and the substrate is a fabric for a bodily fluid absorbing hygienic article, the method further comprising stretching the elastic strand before bonding the elastic strand to the substrate. 35
17. The method of Claim 15 or 16 further comprising spatially separating the strand from the substrate by a distance greater than a droop distance of the adhesive fiber below the strand opposite from where the adhesive fiber is dispensed from above the strand. 40
18. The method of Claim 15, 16 or 17 the adhesive fiber is a hot melt adhesive, the method further comprising dispensing the adhesive fiber from a spiral nozzle in a swirling pattern to move the adhesive fiber back and forth across the path of the strand beyond opposing sides of the strand as the adhesive fiber is dispensed toward the strand. 45
19. The method of any one of the claims 15 to 18 further comprising bonding the adhesive coated strand to a second substrate, whereby the strand is disposed between the substrate and the second substrate. 50 55

20. The method of any one of the claims 15 to 19, the adhesive fiber is a hot melt adhesive dispensed from an adhesive orifice of a meltblowing nozzle, the method further comprising vacillating the adhesive fiber back and forth across the path of the strand beyond opposing sides of the strand with first and second air flows dispensed from first and second air orifices disposed on opposing sides of the adhesive orifice. 5
21. The method of Claim 20 further comprising controlling the amplitude and frequency of vacillation of the adhesive fiber with the first and second air flows so that substantially all of the adhesive fiber is captured by the strand. 10 15
22. The method of Claim 20 further comprising controlling the amplitude and frequency of vacillation of the adhesive fiber with the first and second air flows so that the strand is coated substantially uniformly with adhesive along an axial dimension of the strand. 20
23. The method of Claim 20, 21 or 22 further comprising: 25
- drawing a plurality of at least two strands;
dispensing a plurality of adhesive fibers from a corresponding plurality of adhesive orifices toward a corresponding one of the plurality of strands;
vacillating the plurality of adhesive fibers back and forth across the path of the corresponding strand and beyond opposing sides of the strand with a plurality of corresponding first and second air flows disposed on opposing sides of the plurality of adhesive orifices;
each strand capturing substantially all of the adhesive fiber dispensed from the corresponding adhesive orifice when the strand is spatially separated from the substrate;
at least partially coating all sides of each strand with adhesive when the plurality of strands are spatially separated from the substrate; and
contacting the plurality of adhesive coated strands with the substrate to bond the plurality of strands to the substrate. 30 35 40 45
24. The method of Claim 22 or 23 further comprising dispensing the corresponding plurality of air flows from the corresponding plurality of air orifices arranged in series with the corresponding plurality of adhesive orifices. 50
25. The method of Claim 22, 23 or 24 further comprising dispensing at least two adjacent adhesive fibers from corresponding adhesive orifices offset axially relative to each other along the path of the strand. 55

FIG. 1

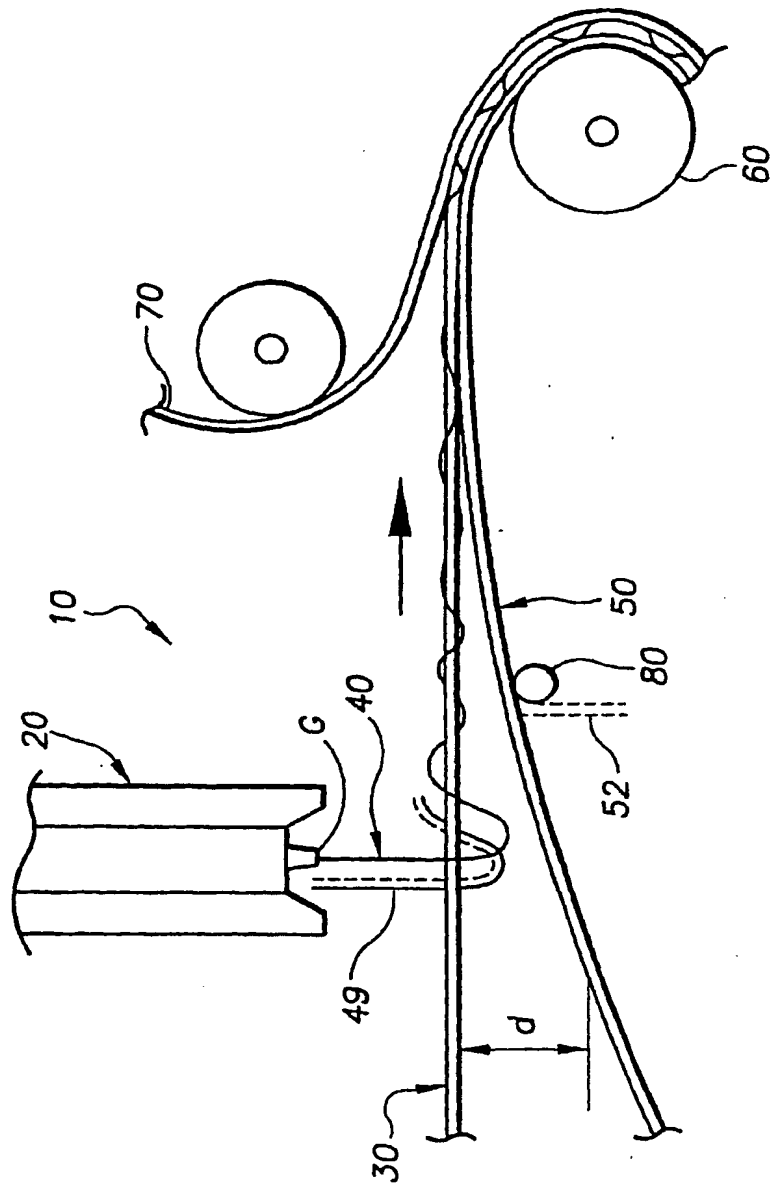


FIG. 2a

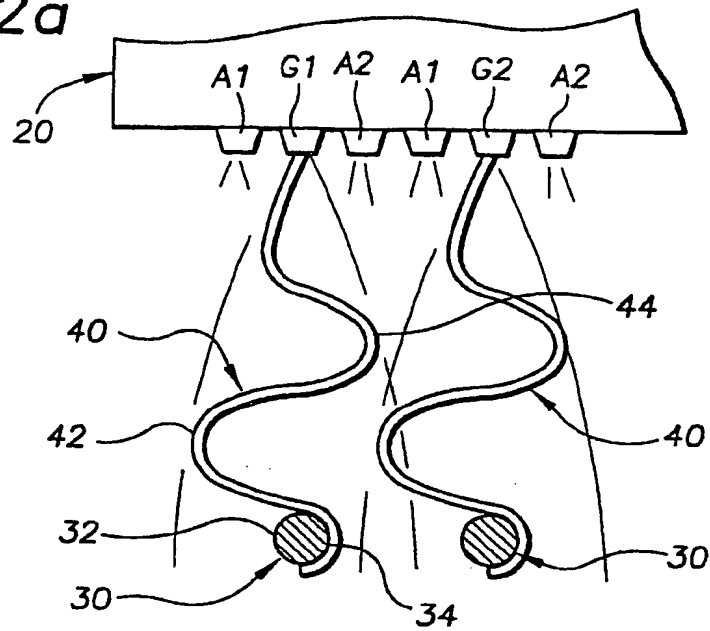


FIG. 2b

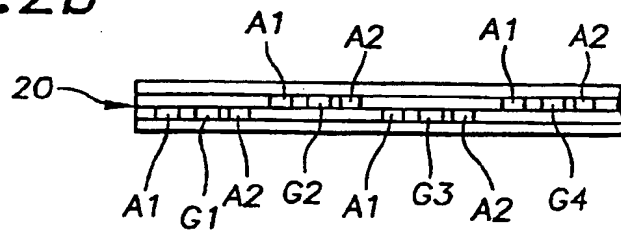
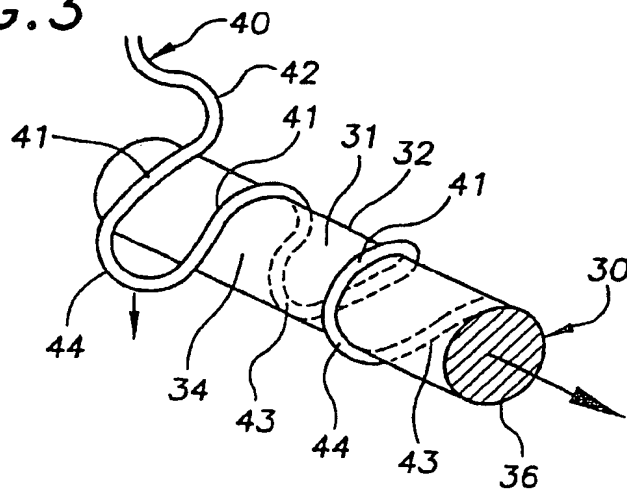
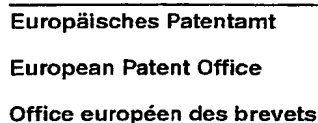


FIG. 3





(88) Date of publication A3:
29.11.2000 Bulletin 2000/48

(51) Int. Cl.⁷: **B05C 5/02**, A61F 13/15,
D02G 3/40

(43) Date of publication A2:
20.10.1999 Bulletin 1999/42

(21) Application number: 99105750.6

(22) Date of filing: 22.03.1999

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
 MC NL PT SE**
 Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 15.04.1998 US 60581

(71) Applicant:
ILLINOIS TOOL WORKS INC.
Glenview, Cook County, Illinois 60025 (US)

(72) Inventor: Kwok, Kui-Chiu
Mundelein, Illinois 60060 (US)

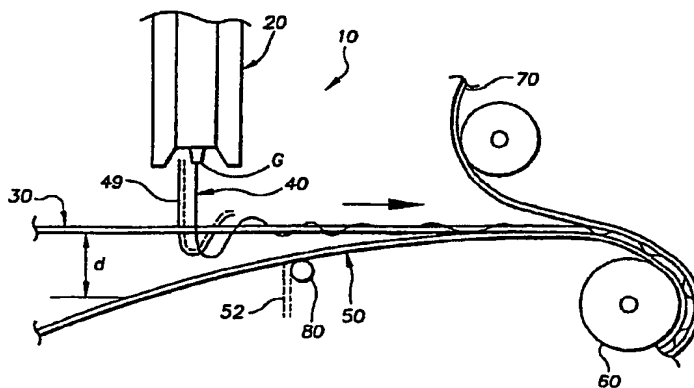
(74) Representative:
Rackham, Stephen Neil et al
GILL JENNINGS & EVERY,
Broadgate House,
7 Eldon Street
London EC2M 7LH (GB)

(54) Elastic strand coating process

(57) A method for applying fluids to a strand and useable for bonding adhesive coated strands (30) to substrates (50) in the production of bodily fluid absorbing hygienic articles, by drawing the strand (30) along an isolated path, moving a fluid or adhesive fiber (40) back and forth across a path of the strand (30) as the fluid fiber is dispensed toward the strand (30), and capturing substantially all of the fluid fiber on the isolated strand (30), and in some applications contacting an adhesive coated strand (30) with the substrate to bond

the strand thereto (50). The adhesive fiber is vacillated back and forth across a path of the strand (30) beyond opposing sides thereof to at least partially coat all sides thereof with adhesive. In bodily fluid absorbing hygienic articles, the methods substantially eliminate fabric stiffening and loss of moisture absorbing capacity thereof, provide substantially uniformly bonding along the axial dimension of the strand (30) to ensure uniform bunching of fabrics, optimum fluid absorption, and comfort.

FIG. 1





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 5750

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 5 501 756 A (ROOYAKKERS JOHN A ET AL) 26 March 1996 (1996-03-26)	1,4	B05C5/02 A61F13/15 D02G3/40
Y	* claims 1-4,6,11 *	2,3,13	
D,X	US 5 507 909 A (ROOYAKKERS JOHN A ET AL) 16 April 1996 (1996-04-16)	1	
A	* column 4, line 10 - line 58; figures 2,5 *	8,16,17	
Y	US 3 903 840 A (GEMELLI JOSEPH C) 9 September 1975 (1975-09-09)	2,3,13	
	* column 3, line 8 - line 59; figures 2,3 *		
X	EP 0 235 815 A (KIMBERLY CLARK CO) 9 September 1987 (1987-09-09)	1,4	
A	* column 4, line 6 - line 35 *	9,23	
	* column 5, line 9 - line 51; figure 1 *		
X	GB 2 148 183 A (FAMECCANICA SPA) 30 May 1985 (1985-05-30)	1,4	
	* claims 1,2; figures 5,6 *		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	EP 0 346 928 A (KIMBERLY CLARK CO) 20 December 1989 (1989-12-20)	1-3,5-7,9-15,18-22,24,25	A61F B05C D01D D02G D04H B05B
	* column 6, line 13 - line 34 *		
	* column 7, line 11 - line 38; figures 1,2,4,7 *		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 4 October 2000	Examiner Jelercic, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04031)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 10 5750

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-10-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5501756 A	26-03-1996	US 5340648 A	23-08-1994
		US 5507909 A	16-04-1996
		AU 645679 B	20-01-1994
		AU 1501792 A	29-10-1992
		CA 2050023 A	23-10-1992
		DE 69223173 D	02-01-1998
		DE 69223173 T	09-04-1998
		EP 0510455 A	28-10-1992
		ES 2108713 T	01-01-1998
		JP 5140511 A	08-06-1993
		KR 187589 B	01-06-1999
		MX 9201446 A	01-10-1992
		ZA 9201784 A	25-11-1992
US 5507909 A	16-04-1996	US 5501756 A	26-03-1996
		US 5340648 A	23-08-1994
		AU 645679 B	20-01-1994
		AU 1501792 A	29-10-1992
		CA 2050023 A	23-10-1992
		DE 69223173 D	02-01-1998
		DE 69223173 T	09-04-1998
		EP 0510455 A	28-10-1992
		ES 2108713 T	01-01-1998
		JP 5140511 A	08-06-1993
		KR 187589 B	01-06-1999
		MX 9201446 A	01-10-1992
		ZA 9201784 A	25-11-1992
US 3903840 A	09-09-1975	DE 2002574 A	05-11-1970
		FR 2030195 A	30-10-1970
		GB 1275714 A	24-05-1972
EP 0235815 A	09-09-1987	AU 586740 B	20-07-1989
		AU 6967387 A	10-09-1987
		BR 8701018 A	05-01-1988
		JP 62276005 A	30-11-1987
		MX 164726 B	21-09-1992
		ZA 8701418 A	26-08-1987
GB 2148183 A	30-05-1985	IT 1159036 B	25-02-1987
		CA 1219433 A	24-03-1987
		DE 3421279 A	10-01-1985
EP 0346928 A	20-12-1989	US 4949668 A	21-08-1990
		AU 618816 B	09-01-1992
		AU 3639289 A	21-12-1989

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 99 10 5750

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-10-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0346928 A		CA 1316336 A	20-04-1993
		DE 68926066 D	02-05-1996
		DE 68926066 T	14-11-1996
		ES 2085263 T	01-06-1996
		JP 2104354 A	17-04-1990
		JP 3032212 B	10-04-2000
		KR 131337 B	14-04-1998
		MX 166873 B	10-02-1993
		US 5342647 A	30-08-1994
		ZA 8904216 A	26-09-1990
<hr/>			

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82